

Session 3 Performance-based Communication and Surveillance (PBCS)

PBCS Flight Plan RCP–RSP Codes

Presented to: Operational Data Link
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Federal Aviation
Administration



Flight Plan RCP–RSP Codes

- **Item 10 → Equipment and Capabilities → Capabilities comprise the following ... :**
 - a) presence of relevant serviceable equipment on board the aircraft;
 - b) equipment and capabilities commensurate with flight crew qualifications; and
 - c) where applicable, authorization from the appropriate authority.
- **Item 10A → Radiocommunication ... equipment and capabilities**
 - P1 → CPDLC RCP 400 (See Note 7)
 - P2 → CPDLC RCP 240 (See Note 7)
 - P3 → SATVOICE RCP 400 (See Note 7)

Note 7 – Reference to PBCS Manual (Doc 9869)
- **Item 10B → Surveillance equipment and capabilities**
 - *Note 1.— The RSP specification(s), if applicable, should be listed in Item 18 following the indicator SUR/.*
 - Reference to PBCS Manual (Doc 9869)

2012 Flight Plan Implementation Guidance

P1 through P9 codes are not new → they were reserved for RCP in 2012 flight plan → approved May 2008 → APANPIRG/21 concluded on implementation guidance Sep 2010

Use of P1-P9 in Field 10a

5.0 **Software Coding Considerations ...**

5.2 In relation to the use of P1-P9 in Field 10a (Radio communication, navigation and approach aid equipment and capabilities), Amendment 1 identifies alphanumeric entries P1-P9 in Field 10a as “Reserved for RCP.” The following guidelines regard filing and processing P1-P9 in Item 18:

- a) Even though there is no need for this information now, ANSPs should accept P1- P9 if filed in a flight plan and pass the information in AIDC messages, but with no interpretation or processing required. This will avoid transition issues and minimize necessary coordination when these items begin to be used in the future. ...

7.0 **Differentiating between NEW format and PRESENT format ...**

7.4 Once an ANSP has announced it can accept NEW format, assume the filed Flight Plan is in NEW format if any of the following is filed:

- a) In Field 10a if any of the following qualifiers are filed: A, B, E1, E2, E3, J1, J2, J3, J4, J5, J6, J7, M1, M2, M3, P1, P2, P3, P4, P5, P6, P7, P8, P9. ...

Why Flight Plan RCP–RSP Codes?

Operators have choices for their “data link”

Technology

- **FANS 1/A**
- **ATN B1**
- **B2**
- **VDL M0/A**
- **VDL M2**
- **HFDL**
- **SATCOM**
 - Classic Aero on I3/I4
 - Data 2/Data 3
 - SwiftBroadBand (SBB)
 - Short Burst Data (SBD)

+

Implementation

- **AOC**
- **Cabin Services**
- **Configurable Avionics**
- **Procedures**
- **CSP/SSP**
 - SITA
 - ARINC
 - Inmarsat
 - Iridium
 - MTSAT



Different
capability and
performance

+

System changes
and corrective
actions

... and ATM operations, such as applying performance-based separation minima, are predicated on that capability and performance

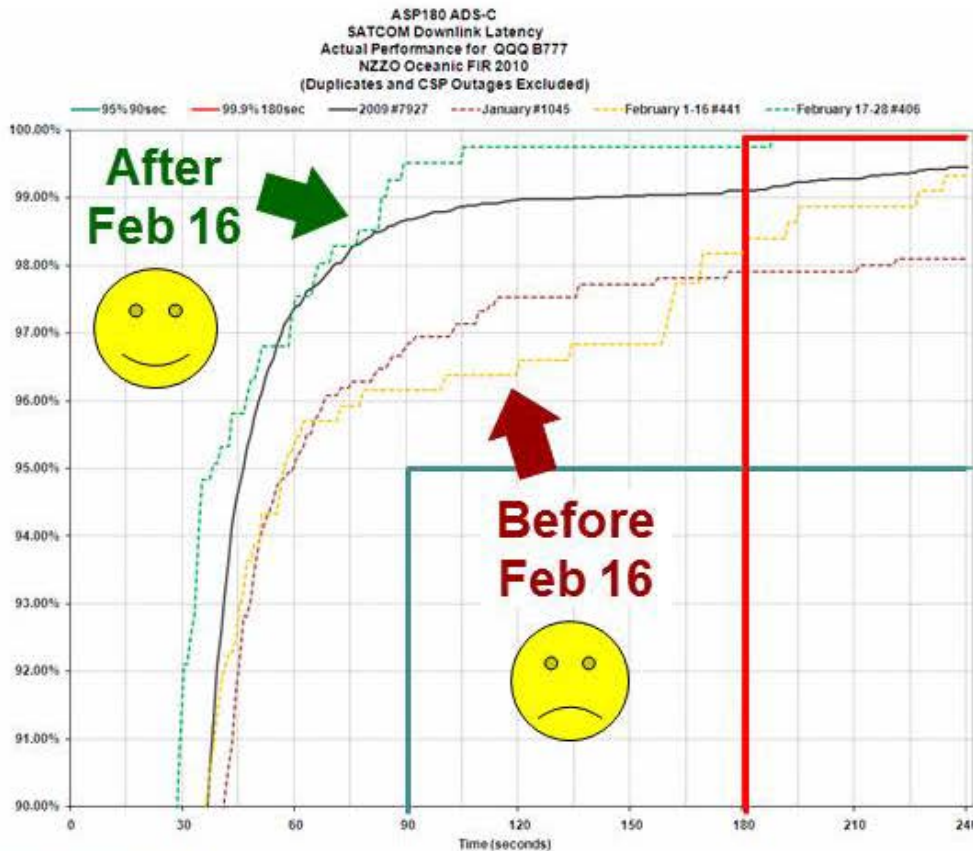
Current situation – Problem

The “system” can potentially apply separation minima to non-compliant operator/aircraft

This is occurring today



Example 1 – B777 Media Transition Issues



Performance improvement from upgrades

We believe this new fleet of B77W was fitted with AIMS BP14 on delivery. It also does not use SITA VHF while in NZZO. The graph shows significantly improved performance after R15 upgrade (Feb 16) at Santa Paula.

The fleet is now meeting the type 180 requirements.

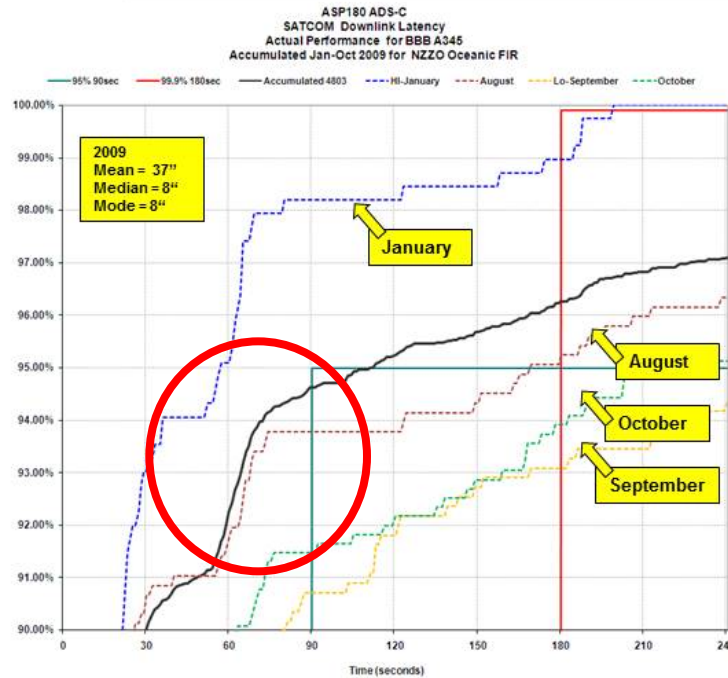


AIRWAYS
NEW ZEALAND

Example 2 – A340 Cabin Service Interference using Data 3

FANS-1/A Performance Needed – Data2/Data3 Interaction

Auckland
Oceanic FIR



AIRWAYS
NEW ZEALAND

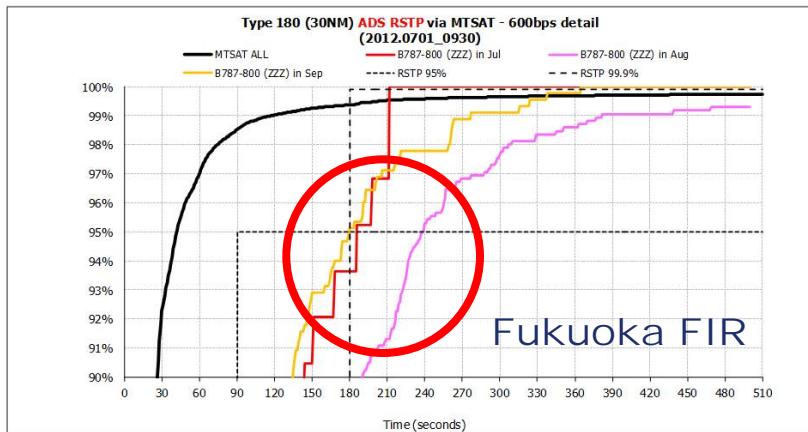


Example 3 – B787 Channel Speed

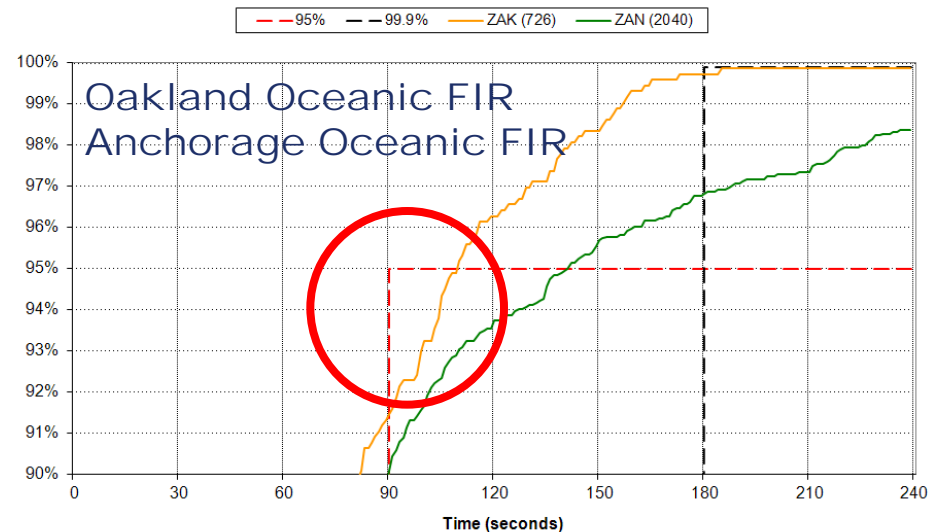
Observed ADS-C Performance of B788

July to September 2012

Operator ZZZ	Jul	Aug	Sep	Total
B787-800	63	852	451	1,366



Aggregate B788 Performance By FIR - January to August 2012 ADS-C Downlink Latency (Duplicate Messages and Messages During Reported DSP Outages Excluded)

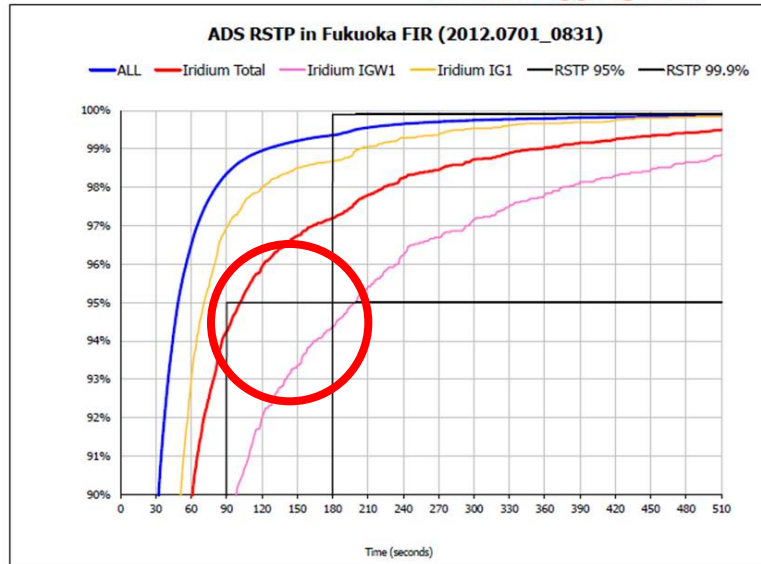


- **FAA and JCAB analysis indicate that Low Speed ACARS (Inmarsat 1200bps / MTSAT 600bps) is not appropriate media for the Boeing787 with reduced separation minima predicated on RCP/RSP**
- **Operator should ensure B787 avionics is configured to use high speed**

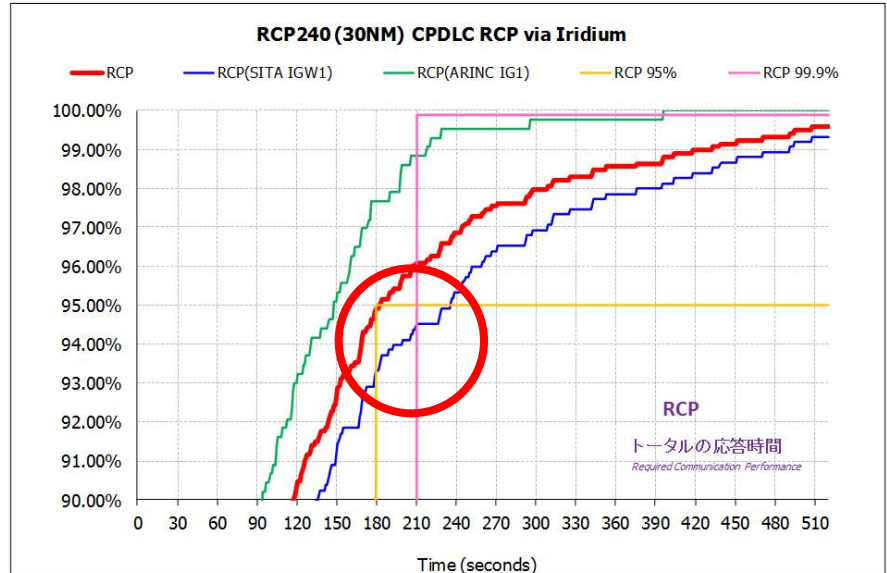
Example 4 – FANS 1/A over Iridium

Fukuoka FIR

Iridium RSP180 **Fukuoka FIR Aggregated**
& **Iridium Aggregated**

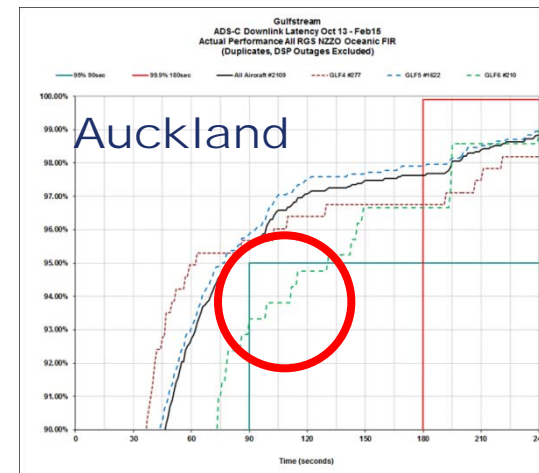
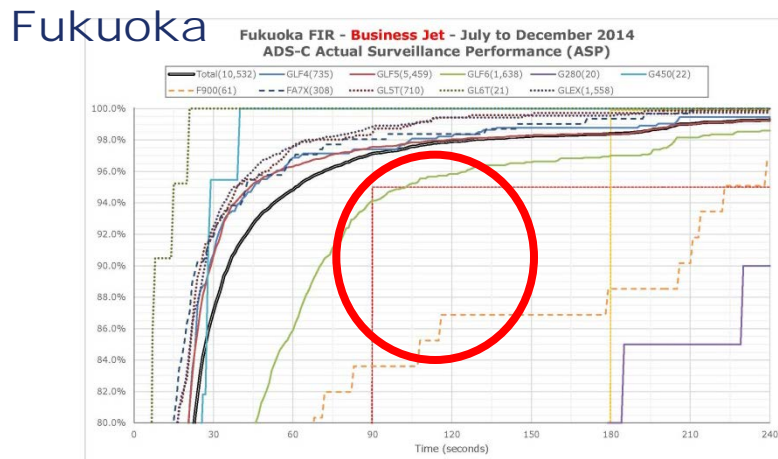
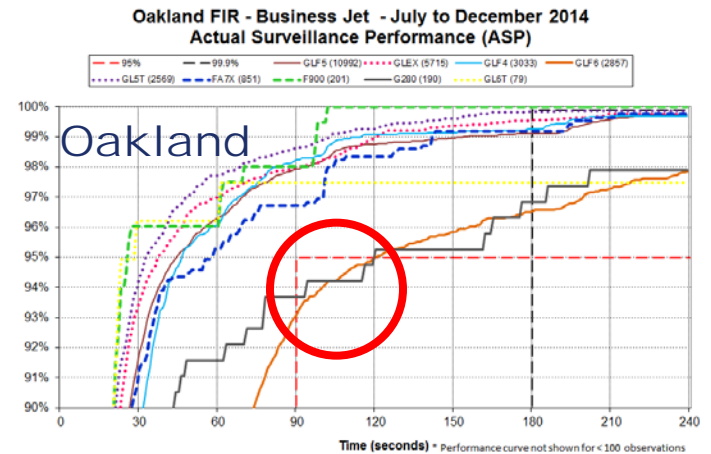
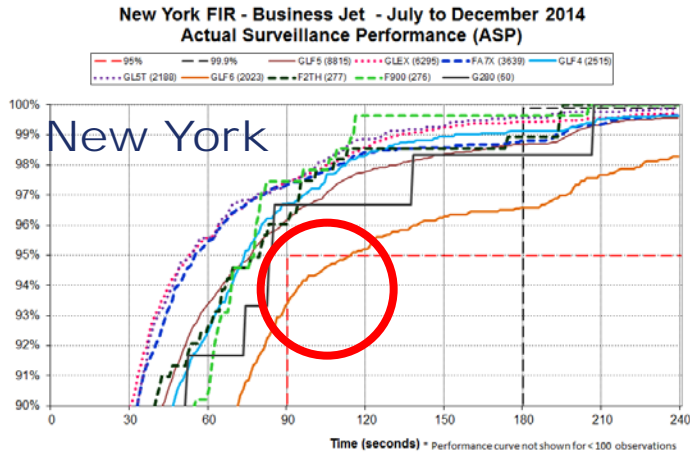


Iridium RCP



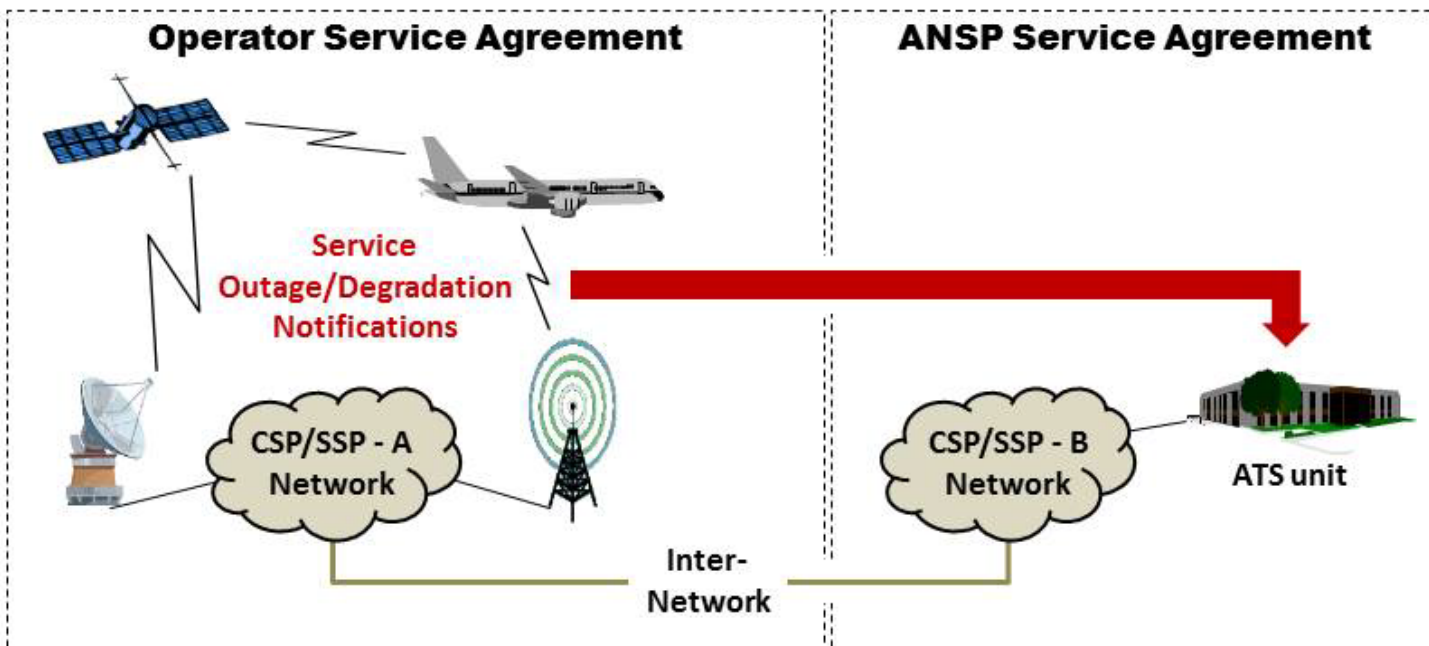
- The Gateway IG1 (ARINC) performance in this analysis Includes internetworking and Co-CSP ground network latency
- Investigations on-going

Example 5 – Gulfstream



Example 6 – CSP/SSP Service Agreement

- ANSP and Operator both negotiate service agreements with CSP/SSP
- Operators may choose a CSP/SSP that is different than the CSP/SSP chosen by their relevant ANSPs—for the areas identified in operational specifications
- The operator must ensure that its service level agreement includes requirement for its CSP/SSP to provide service outage/degradation notifications to relevant ANSPs



RCP–RSP Codes Allow Issue Resolution

- **Known issues**

Ex 1 → B777 network media transitions

Ex 2 → A340 Cabin Service Interference

Ex 3 → B787 Channel speed

Ex 4 → FANS 1/A over Iridium

Ex 5 → Gulfstream

Ex 6 → CSP/SSP Service Agreement

Operator/Aircraft/CSP/SSP

Operator/Aircraft

Operator/Aircraft

On-Going Investigation

Recent – Under Investigation

Operator/CSP/SSP

- **Other Known issues**

- AOC shares A-G link with ATS according to operator policy

- Pilot operational response time (PORT)

Operator/Aircraft

Operator/Procedures/Training

- **Future changes, e.g. SBB and Certus**

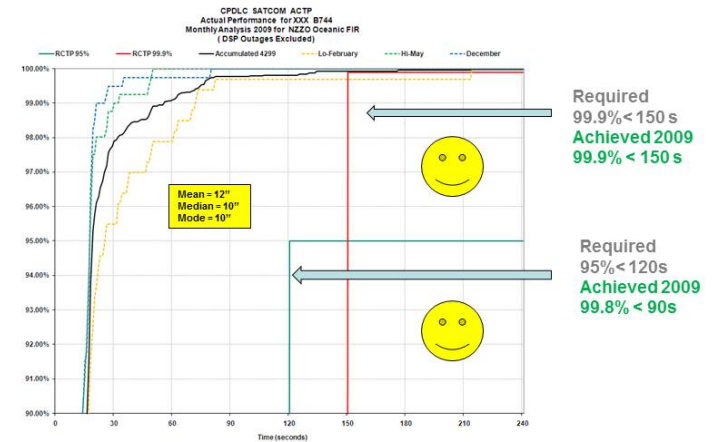
RCP/RSP Criteria are Achievable

But you have to find the problems ...

FANS-1/A RSP – It is consistently achieved



FANS-1/A RCTP – It can be achieved



And fix them!

Benefits of Flight Plan RCP–RSP Codes

- **Paramount** – Ensure **SAFE** application of performance-based separation minima
- **Allows ANSP to effectively plan the days air traffic load based on capabilities**
- **Allow ATS system to automatically determine eligibility of aircraft, similar to PBN codes (e.g. L1 for RNP4) → eliminate need for manual procedures**
- **Signify initial approval → eliminate the need for ANSPs to “police” for “noncompliant” operators/aircraft types**
- **Allow non-compliant operators to continue to use capabilities, such as CPDLC and ADS–C, for operations that do not require compliance to certain RCP–RSP specifications**
 - For example, aircraft tracking
 - ATS systems can use RCP–RSP codes to optimize performance by adapting system parameters to filed RCP–RSP capability (e.g. adjust protocol timers for slower networks, such as HFDL)
- **Allow transition to more stringent RCP–RSP specifications to accommodate advances in technology to further efficiency gains in ATM operations**
 - For example, space-based ADS–B surveillance and higher bandwidth and faster networks for communications, such as SwiftBroadband and Certus



Conclusion

- **Filing RCP–RSP codes in the flight plan and their use are essential to the global PBCS concept**
- **The global PBCS concept ensures that we are *safely* providing air traffic services predicated on communication and surveillance capability and performance**



